

GEMINI

LEARNING TO LIVE IN SPACE

SPECIAL REPORT

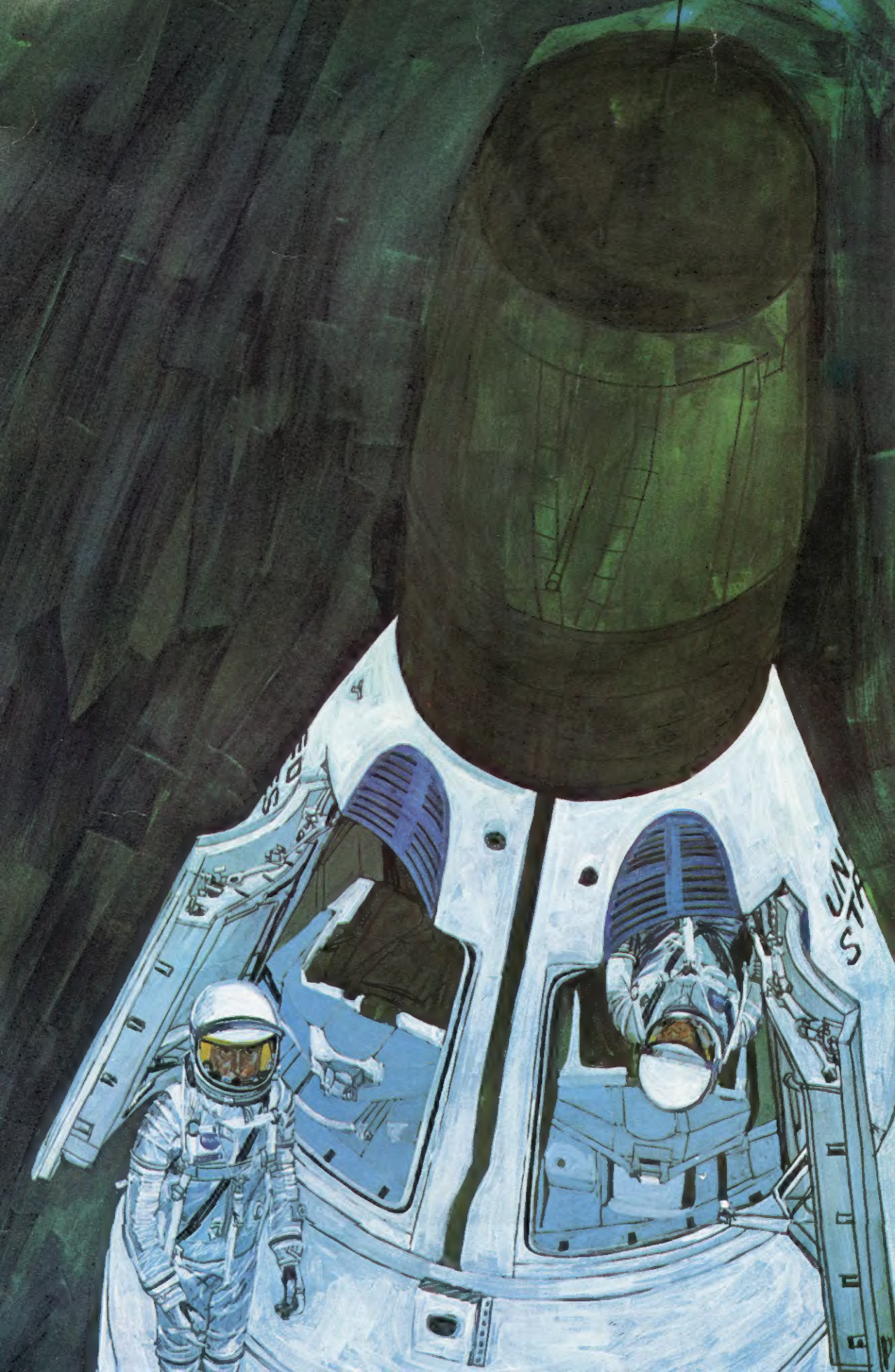




"This is Mercury Control"... words familiar to people all over the world as the signal for attentive listening for minute-by-minute reports of the progress of America's men in space. Our trail-blazing space pioneers have now verified that man can not only survive in space, but can perform constructive tasks and contribute the all important human judgment needed as an integral part of the spacecraft to assure consistent mission success. □ The next step is GEMINI — the free world's second giant step into space, our intermediate step before reaching the moon. This booklet is the story of Gemini. □ In today's world, space-age citizenship requires a new understanding of scientific advances. Just to read and understand current newspapers requires more knowledge of science and technology than a science teacher possessed a generation ago. □ This booklet is intended to help you acquire a better space science literacy — to raise your space-age I. Q. — I found it interesting and informative and know you will, too. □ I hope that I will soon have the privilege of being the one whose voice you hear saying, *"This is Gemini Space Flight Control — All Systems are Go!"*

JOHN A. POWERS

Gemini, the third constellation of the Zodiac, has lent its name to America's next great step forward in space-science achievement... that of bringing to a state of perfection all the complex techniques, equipment and procedures that will ultimately be required to put American astronauts on the moon and return them safely to earth. □ Legend has it that Castor and Pollux were twin sons of Zeus, the supreme god of ancient Greece. Castor was killed. Pollux implored Zeus to let him share his brother's immortality. □ Zeus agreed and placed the brothers into the heavens as the twin stars of Gemini. □ The ancients believed that Gemini gave divine protection to distant voyagers. □ And therein lies the most important explanation of the purpose and name of Project Gemini. It is designed, as a vital bridge between Project Mercury and Project Apollo, to provide the road maps for the ultimate voyagers to the moon. □ Project Gemini is well-named on other counts. □ It marks the first time that two American astronauts will soar into space in a single vehicle. □ It contemplates for the first time the linking of two American space vehicles while in orbital flight. □ Twentieth Century Gemini is a culmination of the essentials known as American ingenuity and know-how as demonstrated by such indispensable firms as **McDonnell** Aircraft Corporation, **The Martin Company**, **General Dynamics** / Astronautics and **Lockheed** Missiles and Space Company, without whom the success of this vital bridge to another world would be impossible.

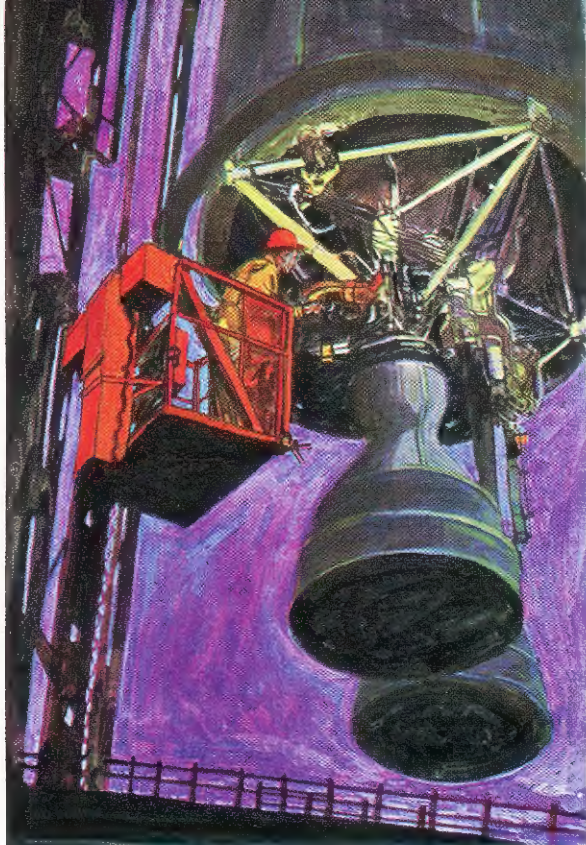






PROJECT GEMINI

Gemini is a grand rehearsal for an American landing on the moon. It is the test and training stage for astronauts, teaching them to live in space and work there for up to two full weeks. They may even emerge from their spacecraft and float weightlessly 100 miles or more above the surface of the earth. They will join their craft to another space vehicle that will have preceded them into the darkness. □ In the Stygian blackness of outer space, the Gemini astronauts will be defying conditions few earthmen have ever encountered — searing heat, almost ultimate cold and utter weightlessness for long periods of time. □ Gemini missions will begin where the successful Mercury entries into space leave off. Mercury allowed single astronauts to remain in space for one-day orbital flights. Gemini will step up the duration of its flights until the two-week objective of living and working in space has been reached. □ Beginning in 1964, a dozen or so Gemini missions will be flown, including three or four flights of long duration. □ The Gemini astronauts will exper-

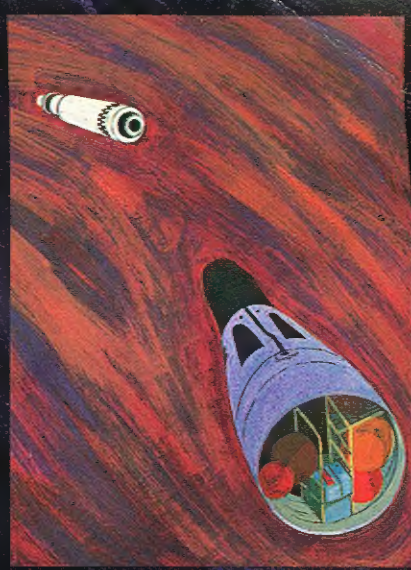


iment with rendezvous procedures and docking methods in space. Each of these experiments will require two launchings, about 24 hours apart. □ First to be launched will be an unmanned Agena D target craft. It will be launched by a powerful Atlas D rocket. Agena D will be precision controlled from the ground to achieve near-perfect orbit some 150 miles above the earth. □ About 24 hours later, the Gemini spacecraft, carrying its two astronauts, will be lifted into space by a Titan II rocket. The Gemini craft will go into elliptical orbit with a perigee of 87 miles and an apogee of 150 miles. □ After a few laps around the earth, Gemini will approach the Agena D target vehicle. □ To overcome orbital path differences, the astronauts aboard the Gemini craft can make flight directional adjustments through use of propulsion units. In addition, ground control can move the Agena D into a corrected position. □ Some 250 miles from the Agena D, the astronauts aboard Gemini may train their radar and digital computer on the target vehicle. The initial approach will be controlled by the Gemini crew. The astronauts may elect to maneuver their craft manually toward the target by use of radar. □ Twenty miles from the target, the astronauts will be able to see



the Agena D satellite. From then on, they can complete their rendezvous by visual observation. □ At this point, the two craft will be racing practically together through space. By the time the astronauts prepare for the actual docking operation, the speed of the two craft will differ only by one or two miles per hour. □ Cautiously, and under manned control, an "index bar" from Gemini will feel its way like a probing finger into the docking collar on the Agena D. This will be the very first contact between the two craft. The astronauts, maneuvering and watching each move carefully, will then thread the cone-shaped nose of Gemini into the docking collar. Then the clamps inside the collar will latch firmly around the Gemini cone and lock the two vehicles together. □ At that instant, the instrument wires of the two craft will automatically connect. With this final and remarkable precision movement, the Gemini astronauts will have gained control over the Agena D which, until that moment, had obeyed only orders given from earth. □ The astronauts will then operate both spacecraft as if they were a single vehicle. They will check out all instruments aboard the Agena D, its rocket engine and other systems. □ They could even change







orbits at will. □ While previous landings from space were made only at sea, the Gemini crew will be able to put their craft down on land in an area selected for this purpose. This, too, is a preview of techniques which will later be used to return Apollo astronauts to earth from their moon voyage. □ One of the methods being developed to bring the Gemini vehicle safely back to earth and to actual landing is the "Rogallo Wing" or paraglider. This is an inflatable glider plane stored behind a drogue chute inside Gemini's cone-shaped neck. □ On its return journey to earth, at a height of about 60,000 feet, the Gemini crew will release the drogue chute to stabilize the craft. At 50,000 feet the paraglider will be inflated. □ By the time an altitude of 42,000 feet is reached, the inflated glider will be fully operational and can then be steered from inside the Gemini vehicle to the selected landing area on the ground very much like a glider. It will land the spacecraft and its crew at a speed of 50 miles an hour, by use of a landing gear consisting of a nose skid and two outrigger skids designed to provide stability and support. □ This accomplishment requires that the astronauts control the Gemini vehicle almost as if it were an aircraft. They must be





able to change course and correct navigational errors through the firing of small reaction jets that are controlled by hand. This maneuverability permits the crew to approach any pre-selected point within an area 200 miles across and several hundred miles long. □ This is all in preparation for our first venture to the moon. □ The moon project is known as Apollo. □ Where Mercury and Gemini vehicles are designed to operate within the orbit of the earth, Apollo will be fired toward the moon and orbit around it. □ Where Gemini carried a much heavier payload than Mercury, Apollo will transport even more cargo, including a lunar excursion vehicle, already known as the "Bug". □ Employing techniques learned in Gemini, the "Bug" will be detached from the Apollo vehicle to rendezvous and dock with it and then descend onto the surface of the moon with two astronauts aboard. □ Upon completion of their mission, the astronauts aboard the "Bug" will rejoin the Apollo craft still in lunar orbit. Further utilizing knowledge gained in Project Gemini, they will join the "Bug" to the Apollo. They will enter Apollo, drop the "Bug" into lunar orbit, turn the Apollo earthward and make their return. □ It is therefore the purpose of Project Gemini to reduce the risks and hazards for men and machines in future Apollo expeditions. The endurance and the working capabilities of the astronauts will have been thoroughly tested through Gemini by the time Apollo is ready. □ Literally thousands of industrial firms are employing the genius and facilities of American science, technology and industry in bringing into reality this remarkable multi-million dollar program. □ Coordinating this giant effort and contributing their own talent, skill and tools to the protection of the moon voyagers in Project Gemini, are four of America's vital aerospace companies. □ McDonnell Aircraft Corporation, prime contractor for the Gemini two-man spacecraft, was selected because of its successful design and construction of the one-man Mercury vehicle. In building the Gemini craft, McDonnell had to solve problems far more complex than those the company had already surmounted in the construction of Mercury. □ The Titan II, which will lift Gemini into orbit, was developed by the Martin Company, Space Systems Division. It was selected for Project Gemini primarily for its powerful thrust which is far greater than that of any other operational launch vehicle, its high reliability and shorter count-down time.



MISSION ACCOMPLISHED: GEMINI A REALITY. NEXT STOP...THE MOON!

□ The Atlas D, which will boost the target Agena D into orbit was developed, after more than 35 million man hours of performance testing, by General Dynamics / Astronautics. It was this booster which carried Glenn, Carpenter and Schirra into successful earth orbit. □ Lockheed Missiles and Space Co. has been responsible for the production of the vital Agena D target vehicle which was selected because of its accuracy, dependable performance and ability to adapt to a wide variety of missions. □ Directing and managing the vast and complex operation of Project Gemini, as in the case of Project Mercury, is the National Aeronautics and Space Administration through its skilled staff of technicians and administrators at the Manned Spacecraft Center in Houston. □ This all means that many heretofore untried techniques, absolutely necessary to a successful moon venture, will come from this project. This new knowledge, combined with experience already gained from the Mercury program, will constitute an indispensable stepping stone in our hopes to put Americans on the moon.

This is Project Gemini.



GEMINI